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THE REVIEW

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R. F. Harrington Talks on Cast Iron at York

Shows How Modern Foundry Technique Makes Reliable Engineering Materials

By George J. O'Neil

York Chapter—R. F. Harrington, foundry superintendent and chief metallurgist, Hunt-Spiller Mfg. Corp., Boston, began his talk on "Cast Iron as Reliable Engineering Material" at the meeting on Dec. 8 with a consideration of the fundamental structural character of cast iron.

Foundry practice was for many years largely an art rather than a science, but science is now occupying a more and more important part.

The excellent properties of modern high grade cast irons were discussed, it being pointed out that the engineer should familiarize himself with present-day values in contrast to the values so often quoted and used from out-moded engineering handbooks.

Progress Made in Carbon Control

The speaker pointed out that progress in making high strength cast iron has tended in the direction of (1) obtaining a low total carbon iron, generally by control of melting processes; and (2) special metallurgical processes to control the form of carbon which separates out as graphite in the metal.

The important part played by alloys and heat treatment was also discussed.

Engineering properties of cast iron were listed, particularly the property of damping, which in recent years has brought cast iron to the fore in many

(Continued on page 4)

Varied Program of Slides And Films Presented to Clarify Flame Hardening

By G. E. Healy

Oregon Chapter—So effective was Prof. S. H. Graf at the meeting on Dec. 2 in outlining the benefits to be derived from membership in the Society that four of the guests requested membership applications to fill out.

Norton Peck introduced Harry Speith of the Western Steel Casting Co. and announced that the meeting was to be devoted to the subject of flame hardening of carbon and alloy steels. Mr. Speith introduced Fred Theiss of the Central Machine Works who had co-operated with him in the preparation of the films he was to show.

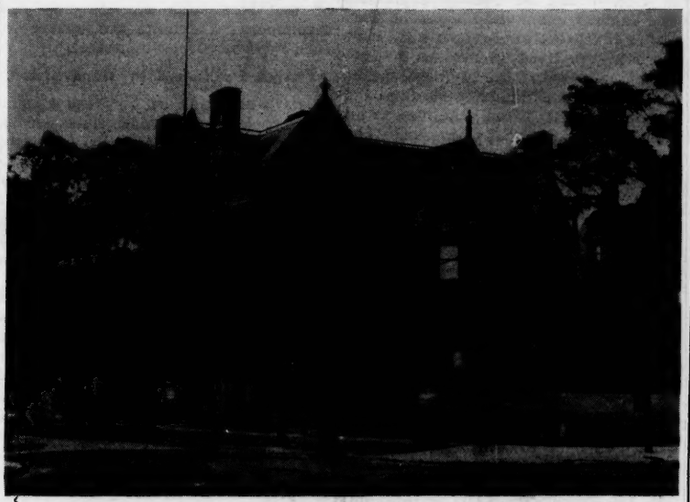
Professor Graf exhibited slides showing the iron-carbon diagram and outlined some of the theoretical aspects of flame hardening. Other slides depicted the microstructure of some samples sent him by Mr. Speith.

L. H. Place of the Air Reduction Company read a paper prepared by G. V. Slottman on flame hardening.

Following Dr. Slottman's paper, slides and a film prepared by the Air Reduction Co., showing applications and methods of using flame hardening, were shown.

Mr. Speith then presented pictures he had taken at the Central Machine Works showing the application of flame hardening on various types of work.

New National Headquarters for A.S.M.



Three-Story, 24-Room, Stone Mansion Recently Purchased by the Society for a Permanent National Headquarters. This building is located at 7301 Euclid Ave., Cleveland, just a short distance from the present national office. This property is still the home of Robert C. and Laurence H. Norton of Oglebay-Norton Co., the original owners. The new home will be occupied by the Society after Jan. 1, 1940. (Refer to December issue of THE REVIEW *for details of purchase published in Minutes of the Board of Trustees Meeting.)*

Shipbuilding Problems Discussed After Inspection Trip on Nearly Complete Ship

Ffield Is Speaker on Marine Construction; Shane Gives Coffee Talk on U.S. Navy; Ashworth Talks About Use of Stainless

By A. J. McDuff

Boston Chapter visited the Fore River plant of the Bethlehem Shipbuilding Corp., Ltd., Quincy, Mass., on Friday, Nov. 4. Included was an inspection trip aboard the S.S. Panama now nearing completion for the Panama Railroad Steamship Co.

Former chairman of the Chapter, E. B. Ashworth, after a few words of welcome, mentioned some of the trials and tribulations connected with the use of stainless material in marine construction.

He told how he helped an inspector differentiate between plain and stainless steel by using a magnet, and how later the inspector got mixed up testing stainless iron. He mentioned how the painters used to clean polished stainless steel parts by rubbing with steel wool with the subsequent development of rust.

The coffee talk by Captain Louis Shane, U.S.N., was on the "Peacetime Value of Our Navy". In 1882, the Navy required the use of domestic steel in the construction of its ships and, as a consequence, the steel industry of that day had to expand tremendously to meet this demand.

The Navy has fostered the development of many other things until the public could benefit economically from them. Among the things mentioned were radio and the radio telephone, the gyroscope, gear reduction, diesel engines, usable specifications.

Some years ago the speaker made a trip abroad to find out why European castings were superior to American. He observed that the Europeans were using American methods and we were not!

The technical talk of the evening was given by Paul D. Ffield, materials engineer of the Bethlehem Shipbuilding Corp. His talk was extremely interesting and brief—both attributes appreciated by Chapter members and guests tired from tramping all afternoon through the shipyards.

The development of the method of joining the blades of steam turbines by brazing was described, together with the method employed in building up shop interest to the point where the practical application would be a dependable success.

In this development extensive study of dilation characteristics was made in addition to the consideration of the high temperature strength and ductility and creep of the materials involved. By the process of guided self-education, the men in the shops learned the reasons for the particular care required and took pride in turning out a perfect product.

Compliments

To **Thomas D. Taylor** of Bliss & Laughlin and the **Rochester Chapter** on taking to the air with some very favorable publicity (see page 2, column 4).

To **Claud S. Gordon**, member since the year 1, on celebration of the silver anniversary of the Claud S. Gordon Co.

To the **Montreal Chapter** on its thoughtfulness and generosity in distributing food and clothing to needy families at Christmas time.

Detroit Divides Into 5 Groups For Discussion

Round Tables Held on Hardenability, Salt Bath Heat Treating, Soft Soldering, Microscopy, Pearlitic Malleable

By V. A. Crosby

Detroit Chapter—Contrary to the generally accepted idea that round-table discussions are held only when the program chairman falls down on the job, the Detroit Chapter deliberately planned the Nov. 14 meeting for five round-table discussions held in separate rooms fitted with lantern screens and blackboards.

Some 150 members attended the various sessions which were preceded by the usual dinner at the Fort Shelby Hotel. An entertaining and humorous after-dinner talk was given by Harry Kipke, former football coach at University of Michigan.

Harry proved beyond a doubt that the path of a football coach is even more hazardous than that of a metallurgist. Pointing out that the heavy turnover in coaches was not confined only to the big colleges, he mentioned that even a lowly institution such as "ole Miss." may rise up in righteous indignation and fire the coach.

Harry McQuaid led the discussion for the group on *Hardenability* and as usual, where Harry appears, a great deal of discussion follows. This is probably because of the belief that Harry has the answers, but is prone to part with them only after much questioning.

The *Salt Bath Heat Treating* group led by Harry Ford of the Ford Motor Co. drew a very enthusiastic and argumentative crowd. Chairs had to be provided in the door and hallway to this room. Mr. Ford briefly reviewed the status quo of the subject and then proceeded to guide the discussion until after 11:00 o'clock.

Soft Soldering, led by R. H. Hobrock, attracted a somewhat smaller group, undoubtedly because of its appeal only to non-ferrous members.

Microscopy in its various ramifications was dealt with ably by L. V. Foster of Bausch & Lomb Optical Co.

The group interested in *Pearlitic*

(Continued on page 7)

Indianapolis Inaugurates Plant Visitation Program

By Ralph A. Thompson

Indianapolis Chapter is well launched on another successful year with especially good talks scheduled.

A plant visitation program has been inaugurated in connection with the meetings and the first one was held at the Electric Steel Castings Co. The shop was in full operation late in the day for the convenience of those interested; a heat was poured and all the other operations shown to the visitors.

S. C. Lawson of Ampco Metal, Inc., Milwaukee, was the speaker in the evening and talked on bronzes.

The December meeting was held on the 19th and E. J. Hergenroether of the International Nickel Co. addressed the Chapter on the use of nickel.

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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Alloy Steels Require Customer Contacts To Solve Problems

By J. W. McBean

Ontario Chapter — Robert Sergeson, chief metallurgist of the Park Works of the Crucible Steel Co. of America, spoke at the November meeting on "Metallurgical Service of Alloy Steels."

Mr. Sergeson opened his talk by stating that unlike commercial carbon steels, the alloy and special steels cannot be readily tested to insure their ultimate success without a knowledge of their fabrication and use. To obtain such information necessitates contacts with customers by trained men experienced in these steels and fabrication.

Although steel making is still an art, many factors can be controlled. The metallurgical department follows and checks the many operations in the steel plant—melting, pouring, rolling, forging and heat treating. A second function of the metallurgical department is to aid the sales department in supplying technical data and information on new developments. The third function is that of customer contact to develop his needs and understand his shop conditions.

Some of the problems involved and some of the work being carried out in anticipation of customers' wants were indicated by slides.

For instance, a bar ruptured at the corners because of insufficient heating which left a hard core. The quenching of high carbon axe steel in brine at 102° F. gave soft spots readily detected by sandblasting, a condition corrected by lowering the temperature to 70 to 80° F. and increasing circulation.

Contractor chisels (carbon steel) heated to too high a temperature hardened through the cross-section and cracked at the weakest point, since stress was transmitted there without absorption. The same steel quenched from the proper temperature produced a hard shell with softer core and gave satisfactory results, since the core absorbed and dampened the shocks.

In improving machinability, the effects of sulphur, selenium and, more recently, lead, were acknowledged. Certain other steels must be annealed to develop proper machining structure.

The effect of sharp changes in structure, of stamping figures on bars, and even points of contact in magnaflux testing were mentioned as causes of fatigue failures.

Palmer Speaks Steel Treater's Language in Talk on Tool Steel

New Ideas Include Rapid Heating of Water Hardening Steel, Judging Time Required for Heating by Diameter of Piece

By Walter M. Saunders, Jr.

Rhode Island Chapter—A record attendance of almost double the Chapter's actual membership on the evening of Dec. 7 can be readily explained. The famous Frank R. Palmer of Carpenter Steel Co., whose topic was "New Ideas in the Heat Treatment of Tool Steel", appeared as the technical speaker, and at the dinner preceding the meeting J. H. Pasell, Morse Twist Drill & Machine Co., spoke on "The Government of the Bee Hive". Mr. Pasell talked very entertainingly on the work and life of the honey makers.

Mr. Palmer's talk was packed with practical observations and recommendations. He speaks the steel treater's language.

Possibly the most striking "new idea" was his recommended heat treatment of water hardening tool steels. The procedure is to heat the furnace to the desired quenching temperature, put steel in furnace, and heat as fast as possible. After coming to heat, allow 5 min. per in. of thickness, and then quench in 5 to 10% brine.

In Mr. Palmer's own words, "Bang it up, and then bang it down," which was quite a shock to some of the audience, until they realized that he referred to a modern tool steel with proper "timbre" or "personality".

Average Tool Only 50% Perfect

After giving a good tool formula, in which design, tool making, selection of tool steel, and proper heat treatment are the factors involved, Mr. Palmer stated that the average tool is not one half as good as it could be, and some may be only 10% perfect. He showed that if any one of the four factors is zero, the tool is not 75% perfect, but entirely imperfect.

Mr. Palmer claimed that time required for heating steel to the hardening temperature is proportional to the diameter of the piece, and not the volume. This claim was justified by test pieces of varying diameter, with thermocouples in the center of each piece, welded to the surface of the steel, and in the furnace space.

On the important subject of furnace atmospheres, Mr. Palmer admitted that his views had changed since 1927. Then he preached that a slightly reducing atmosphere was best for tool steel.

He has since found that an oxidizing atmosphere is necessary for many types of tool steel, and his company now recommends a definite atmosphere for each type of carbon tool steel.

Oxygen Determined by Wood Blocks

His description of how the amount of oxygen in the atmosphere can be accurately determined to 1% by noting the appearance of wood blocks in the furnace is a truly new idea. For most water and oil hardening tool steels, a 3½% oxygen atmosphere is best, and the flame from a small wood block in such an atmosphere is half blue, and half yellow.

Wood blocks are useful up to 6% oxygen; from 6 to 10% oxygen, an illuminating gas torch or a lump of bituminous coal is employed. Bituminous coal will burn with a full smokeless flame at 10% oxygen.

In the discussion period Mr. Palmer stated his belief that preheating in many plain carbon and low alloy tools is not necessary, but did not advise the complete elimination of preheat.

He felt, too, that more pieces are cracked by packing holes with asbestos, than if they are left unpacked, and recommended steel wool for holes, and only then, if the holes are near the edge of the piece. He discouraged the use of fireclay as packing material.

Need of Technical Training In Steel Industry Shown

Baltimore Chapter, at its third meeting, heard S. J. Cort speak on "The place of the Technical Man in the Steel Industry".

Mr. Cort has had an important part in the rapid change from a practically "rule of thumb" business to the mighty technical steel industry of today. He emphasized the need of technical training in today's progress and drew on his rich experience to show what place technical men have had in past developments and will have in future developments.

Mr. Stringer of Revere Brass and Copper Co., Mr. Morton of the Koppers Co., and Mr. Gathmann of Gathmann Engineering Co. were called upon for discussion, and gave several interesting additions.

These three men, incidentally, are the heads of three of the six sustaining firms at present affiliated with the Baltimore Chapter. The other three sustaining members are Rustless Iron and Steel Co., Black & Decker Mfg. Co. and the Baltimore Tool Works, whose representatives unfortunately were unable to attend the meeting.

Double Bill Features Graphitic Steels and Powder Metallurgy

Cleveland Chapter put on a "double-feature night" on Dec. 5, turning out about 350 members and guests to hear a coffee talk by F. R. Bonte of Timken Steel and Tube Co. on "Graphitic Steels", followed by a paper on "Powder Metallurgy" by Gregory Comstock of Handy & Harman.

Mr. Bonte described the properties obtained in these special steels by graphite precipitation, and showed how the ratio of combined to graphitic carbon is controlled. A number of slides showed the various microstructures and physical properties obtained by different heat treatments, and many successful applications were illustrated.

Mr. Comstock prefaced his address by stating that he considered powder metallurgy to be still embryonic in spite of its recent rapid advances. He then pointed out that the first metal to be recovered in this way was probably platinum, followed by tungsten, molybdenum and tantalum.

The more recent uses of metals in powder form for the production of porous bearings, electrode material, and hard cemented carbides were put forward by Mr. Comstock as examples of how powder metallurgy accomplishes results not possible of attainment by other means.

The different combinations, affinity and non-affinity, were explained, how the result is influenced by the particle and bond characteristics, and the methods of production and control of particle size discussed.

Various combinations which can be successfully bonded were presented, and the advantages of hot and cold press methods of forming enumerated.

Mr. Comstock stated that coining of parts from iron powder is successful; he considers it capable of producing parts stronger than cast, since there would be no rejection of impurities to the grain boundaries.

Gleanings...

. . . from the chapters

Orchids All 'Round

EXCERPT from the daily news broadcast of Al Sigl of the Rochester Times Union, Rochester, N. Y.: "Just while we are on the subject of technical society meetings, I'd like to pass on to you some of the thrill I got from a meeting last night of Rochester Chapter, American Society for Metals, at the University of Rochester. I heard a talk on the manufacture of a certain type of steel and its advantages, and I was surprised to realize how fascinating a topic like that can be. I certainly shall welcome the chance to attend more such meetings."

Just the fact that Mr. Sigl stayed through to the end of the meeting after delivering the coffee talk should be a feather in the Rochester Chapter's cap; his words, so unusual from a layman, are an even bigger feather in the cap of Thomas D. Taylor, metallurgist, Bliss & Laughlin Steel Co., who spoke on "Leaded Cold-Drawn Steels".

New Ideas

"INFORMATION Please" is the inspired title of the educational course conducted by the Boston Chapter starting Jan. 27. On each lecture night, four members of the Boston Chapter, each thoroughly familiar with either the practical or theoretical side of metallurgy and allied subjects, will form a panel to answer questions and discuss specific problems previously submitted by members of the Chapter.

Novel also is the idea hatched in the North West Chapter. Each of the ten lectures in the current series will be held in a different local industrial plant and accompanied by actual laboratory demonstrations.

The term "Progress" is used instead of "Education" to designate the study courses inaugurated by the Dayton Chapter. Three discussion groups on "Metallography", "Practical Heat Treating", and "Non-Ferrous Metals" will meet regularly. Practical application of theoretical learning will be obtained by the pooled information of the group.

Montreal Santa Claus

MONTREAL Chapter became fully infused with real Christmas spirit last month when it sponsored the distribution of 30 baskets of food and toys to needy families on Dec. 23. It was found that a number of these families were sadly in need of clothing and shoes, and the members are now busy collecting donations of wearing apparel for adults and children of all ages.

Invitation

THE first annual Valentine dinner dance of the Pittsburgh Chapter will be held on Feb. 10. The Chapter extends a cordial invitation to any A.S.M. member who should happen to be in Pittsburgh on that date to attend.

February 17 is the date for the annual Buffalo Chapter supper dance.

Handbooks on the Way

THE A.S.M. Handbook, now almost as rare as a "limited editions" volume, is soon due to make its reappearance in the form of a bigger, better, more complete, valuable and useful book than ever before. So those who have been waiting patiently for a copy these many months need not despair. The committee is working feverishly, and the book should be ready for distribution by April first.

Steel Failures By Fatigue Are Not Inherent

Fatigue Failures Are Rather Due to Improper Design, Imperfections in Material

By H. D. McCarty

Baltimore and Washington Chapters held a joint meeting at Baltimore on Nov. 21. A large delegation from Washington included Dr. Canfield, Messrs. W. C. Stewart and A. J. Dornblatt.

Major William E. Hoke, original observer of the principle from which the magnaflux method developed, was also present.

The speaker for the evening, Prof. A. V. de Forest of Massachusetts Institute of Technology, was introduced by Vice-Chairman Jeffries of Washington. Professor de Forest has developed many non-destructive methods of testing metal parts, and materials testing was the subject of his talk.

He spoke on the failure of steel parts precipitated by the notch sensitivity of steel, sudden changes in section, or imperfections in the metal. Fatigue properties will be greatly enhanced if the notch or imperfections are machined away.

The speaker stated that the majority of fatigue failures are due to improper design or to imperfections in the material, rather than to inherent properties of the metal. The well-known Rayflex method for fatigue testing was developed by Professor de Forest.

The scratch recording strain gage for measuring dynamic strains is another of his contributions to metal testing. As a method of measurement of extremely local deformation a brittle varnish was developed at M. I. T. which has a rupture strain of 1/1000 of an inch per inch in tension, which is equivalent to 30,000 psi. for steel and 11,000 psi. for aluminum alloys.

The talk was supplemented by slides, and a lively discussion ensued. Afterwards an interesting movie by General Motors entitled "Materials" was shown, dealing with the sources of raw materials used for present-day cars.

Ancient Iron Furnace

Rustic and Quaint Today Is This Old Stone Blast Furnace Which in Its Heyday in the Early 1850's Produced About Three Tons of Iron Per Day. It stands about a mile and a half from the Summit Hotel, well-known summer resort near Uniontown, Pa. To the rear of this structure there originally existed an earthwork bridge for charging the raw materials. (Photograph courtesy Ward M. Robinson, Robert Heller & Associates)

Comment From a Reader

PASADENA, CALIF.

To the Editor:

In looking over the November issue of THE REVIEW, I find a statement which apparently is either misprinted or is misinformation on the part of the author.

The article appears on the first page and is a report of a Milwaukee Chapter meeting by F. D. Steinway. He makes reference to the use of aluminum for a "200-in. telescope at Mt. Wilson Observatory".

This is an incorrect statement in that there is no 200-in. telescope at Mt. Wilson. Mt. Wilson has a 100-in. telescope. The 200-in. telescope is the one which is now in process here at the California Institute of Technology and which is to be placed at Palomar Mountain.

The Mt. Wilson 100-in. Hooker telescope is at present the largest in the world. Some little time ago this mirror was coated with aluminum by a vaporization process. The 200-in. telescope is not yet ready for coating.

The Mt. Wilson Observatory is operated by the Carnegie Institution of Washington. The Palomar Mountain Observatory will be operated by the California Institute of Technology. There is, of course, a close association between the two institutions in astronomical work.

DONALD S. CLARK
California Institute of Technology

Machinability, Topic Of Meeting, Applies Also to Turkey Dinner

By Alfred R. Conti

Chicago Chapter—December 8 marked the last meeting of 1938 and the year was ended with a bang by J. D. Armour with a lecture on "Machinability". The subject being so general and the time so limited, the speaker confined himself to the factors affecting machinability.

If free cutting and proper lubrication are essential factors for good machinability, then the turkey dinner which was served was an adequate example of good machinability. From all reports, no one had to replace or regrind his tools to work upon the material placed upon his plate.

More important perhaps than the machinability of the food partaken is the recutting and reforming of the lives of paroled convicts. Mr. Callender, a well-informed government authority on this matter, presented an insight on this procedure.

He claimed that, given the proper set-up, these men can be reshaped into good citizens. In life unlike that of steel, dirt and segregation tend to retard the process of molding good men out of former parolees.

Speaker Armour was introduced by Technical Chairman E. J. Tompkins, who anticipated considerable interest in the subject of machinability but did not realize so much enthusiasm would be evinced.

Mr. Armour stated that the main reason for all the research was cost reduction which can be accomplished by improved machinability. The factors which affect machinability are the machine, the tools, the lubricants, and the steel.

In regard to the steel, cold working, structure, carbon content, ductility, tensile strength and many other factors affect its machining properties. Solid solution alloys retard machinability and steels with more than 0.30% carbon become harder to work as the carbon goes higher.

After the lecture the speaker was met with a barrage of questions, most of them about the new leaded steels now on the market. After all questions were answered the meeting was adjourned and discussions were carried into the hall, the cloak room, the elevator and the bar.

New and Varied Applications Have Given Great Momentum to Powder Metallurgy In Recent Years, Though Process Is Old

Various Methods of Powdering Are Used to Obtain the Desired Particle Shapes and Sizes and Size Distribution

By F. A. Pease

New Jersey Chapter—H. E. Hall, general manager, Metals Disintegrating Co., Inc., Elizabeth, N. J., presented the November meeting subject, "Powder Metallurgy". Paralleling Mr. Hall's talk were shown some of the finest colored slides ever seen by the New Jersey Chapter, illustrating various shaped metal powders, alloy diffusion studies and many articles fabricated from metal powders.

"Powder metallurgy is the manufacture and fabrication of metals in the finely divided condition." Although not a new subject by any means, great momentum has been attained in the last few years principally because of new and varied applications.

Platinum Powdered in 1825

Precious metal articles were being made from powdered platinum and iridium as early as 1825. Henry Bessemer's success in the manufacture of bronze powders for decorative purposes enabled him later to finance his experiments on the bessemer converter. Probably the best-known development is the incandescent lamp early in the 20th century.

A variety of particle shapes and sizes can be attained, depending upon the material to be powdered, and the method of powdering.

Aluminum flake, used extensively for decorative purposes, is made by wet ball milling (Hall Patents). Particles are produced having a ratio of surface area to thickness as high as 200 to 1.

This particle shape is particularly well suited for paints, since a maximum surface coverage is obtained. Its use in molding work at present is limited because structural planes of weakness are developed.

This method of manufacture is not limited to aluminum alone, but is also applied to lead, copper, nickel, and bronzes.

Atomized Metals Used for Molding

Many of the low melting point metals such as lead, tin, zinc, and aluminum are reduced to powders by atomizing. The molten metal or alloy is passed through a nozzle or orifice and disintegrated by a blast of steam, air or gas which solidifies the metal into form of "tear drops" or small spherical globules.

Variations in particle size can be obtained by manipulating the relationship of nozzle to air blast and viscosity of the metal by super-heating.

Metals in this form are suitable for some types of molding work—lead for metallic packings and brake-bands, zinc as a reducing agent in the chemical industry, aluminum for the calorizing process.

Electrolytic Methods Used

Many powders are produced by electrolytic means, copper, zinc, iron, cadmium, tin, antimony, and silver being examples. These powders may have a very low apparent density and unless given a heat treatment may be too low for some molding applications.

The production of metal powder by the reduction of metal compounds has long been practiced on tungsten, molybdenum, iron, cobalt, nickel, and copper. These materials are characterized by their sponge-like structure, making them particularly well adapted to molding work.

All of the above powders are available in various particle sizes and particle size distribution. Particle sizes range from $\frac{1}{8}$ to 0.00000001 in. diameter.

Refractory Metals Readily Fabricated

The fabrication of finished material, rod, wire, and sheet of highly refractory metals such as tungsten, molybdenum, tantalum, and columbium is most readily accomplished by powder metallurgical methods.

Rapid progress has been made in the commercial production of sintered carbide tools for high speed steel cutting, one of the earliest applications.

The electrical industry has long been a user of powdered materials, first as tungsten filaments, later as electrical contact alloys and most recently the development of permanent magnets of high magnetic properties. Many motor and commutator brushes are made from flake copper with various percentages of graphite.

Colored photomicrographs showing the structure of porous bronze bearings for sintering times of 3, 7, 10 and 30 min. were shown. The diffusion of tin and copper forming a bronze was clearly shown. This material, with porosity as high as 40% in some cases, can be impregnated with oil and finds wide application in the automotive and allied fields in the form of bushings and bearings.

Articles made from the above materials were exhibited by the speaker. A lengthy open discussion of Mr. Hall's talk was led by Chapter Chairman G. M. Rollason.

Pyrometry Reviewed From 1821 to Present

By Bernard Collitt

Montreal Chapter—At the third meeting of the season a motion picture in color entitled "Canadian Rockies Holiday" was shown by courtesy of E. C. Elliott, general passenger agent, Canadian National Railways.

The film, taken by Hamilton H. Jones, was awarded the Hiram Percy Maxim Trophy for 1937, as the best amateur film of the year. It depicted holiday life at Jasper Park in the Canadian Rockies, and the magnificent color and reflection effects gained the keen admiration of the large audience.

The technical portion of the evening's program was a talk by William C. Juram on the theory of "Pyrometry as Applied to Automatic Temperature Control". He reviewed the development of pyrometry from its beginning in 1821 up to the present time.

One point mentioned of very particular interest to the Montreal Chapter was the fact that the first potentiometer pyrometer ever constructed was designed by Professor Callander of McGill University.

The method of control or regulation of furnace temperatures by utilizing the electromotive force of the thermocouple was dealt with at length by the speaker. He laid stress upon the fact that it is useless to apply automatic temperature regulation to any furnace, the temperature of which cannot be regulated satisfactorily by manual control.

Cast Iron Is Discussed As Engineering Material

(Continued from page 1)

special applications. Its excellent resistance to notch effect was also brought out.

The need for selecting bars of proper size in relation to strength factors was mentioned, and the importance of design and foundry practice in solving the problem of progressive solidification was stressed.

Various types of special purpose irons are available to meet certain specific problems, as for example:

1. Moderately high strength irons of 40,000 psi. to resist sliding or frictional wear.
2. Irons of 55,000 to 60,000 psi. and Brinell hardness of 230 to 260.
3. Heat treated irons for special wear resistance problems.
4. Sand and chill cast "Ni-Hard".
5. "Ni-Resist" iron.
6. Invar or 36% nickel iron.
7. Nitricastiron (an iron capable of being nitrided and showing Brinell hardness of 800 to 1000).
8. 35% chromium iron.

In conclusion, Mr. Harrington pointed out that the purchaser can only assure himself of reliable cast iron from an engineering standpoint by purchasing castings from those concerns whose metallurgical and foundry technique is such as to approach perfection in the production of the casting; this not only demands irons best suited for the service intended, but gating, risering and general foundry practice promoting maximum solidity.

Graphitic Steel for Dies Has Improved Lubrication, Machinability, Hardness

By James Patterson and Clinton L. Dornbush

"Graphitic Steels" was the subject of F. R. Bonte's talk to the Los Angeles and Golden Gate Chapters of the Society in November. Mr. Bonte is the inventor of graphitic steel and was sent by The Timken Steel and Tube Division of The Timken Roller Bearing Co. to address the California members of the Society.

Graphitic steels are made in the electric furnace from a good grade of scrap. The steel is cast in a 19 or 21-in. ingot and then hot worked the same as any other high carbon steel to make bars, strip and seamless tubing. The average basic analysis is 1½% total carbon, low phosphorus and sulphur, and approximately 0.85% silicon.

To produce a non-shrinking material the above analysis is changed to 0.75% silicon, and 0.25% molybdenum is added. This non-shrinking alloy is excellent for intricate dies.

Graphite Controlled by Normalizing

The free graphite is controlled by normalizing and a slow cooling anneal. Usually the combined carbon is kept in the eutectoid range. For water hardening the combined carbon is 0.80 to 0.85% and for oil hardening the combined carbon is 0.90 to 0.95%.

The hardness in the as-quenched condition is generally Rockwell C-66. This hardness is reduced to C-58 to 64 depending on how the dies are used.

To date graphitic steel is principally used in cold working dies. The graphite inclusions act as reservoirs for the lubricant. This unusual lubrication, machinability, and the inherent hardness, result in many more parts per die with much smaller rejection of the finished parts, and the material apparently constitutes an improvement over present die steels.

Alloyed with 3% tungsten and 0.50% molybdenum, it can be shrunk by quenching through the opening in the die and attains a hardness of Rockwell C-68 to 69, which is very satisfactory for deep drawing, and bar and tube cold drawing dies.

Graphitic steels can be welded by the electric arc process. The rod should have the same analysis as the material welded. The effect of the welding can be corrected by annealing and it is not necessary to harden the added material.

Mr. Bonte's talk was illustrated with many slides and diagrams. He was asked a great many questions at the finish of the talk, as everyone was greatly interested in the possibilities of this comparatively new product.

Bain Gives Simplified Basis For Steel Hardenability

By M. J. Donachie

Springfield Chapter held its first out-of-town meeting for the current season at the Hotel Weldon in Greenfield, Mass. The speaker was Past A.S.M. President E. C. Bain, of the United States Steel Corp., and his subject was "A Simplified Basis of Hardenability in Steel".

With a brief and humorous introduction Dr. Bain presented his story. In his own inimitable fashion and with aptly descriptive words the speaker built up a simple concept of the materials entering into the hardening action in steel.

A series of slides showed the decomposition of austenite with a panoramic effect which gave the impression of watching a moving picture of a disintegrating structure.

Data slides illustrated the effect of alloy additions on the rate and temperature of decomposition. The effect of austenitic grain growth on hardenability was a beautiful expose of another of steel's inherent mysteries.

The discussion which followed did not terminate when the meeting closed as there were occasional huddles that carried into the wee sma' hours.

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Bronze May Be Soft as Copper, Strong as Steel

Diverse Physical Properties Obtained by Various Combinations of Seven Elements

By Jack L. Coyle

Muncie Chapter—"Bronze receives its name from the ancient town of Brondisium," said Stuart C. Lawson, speaking at the Nov. 17 meeting.

The speaker, a sales engineer for Ampco Metal, Inc., explained that the first uses of the copper alloy were for weapons and decorations. The Colossus of Rhodes, an enormous statue of Apollo which is one of the seven wonders of the world, was executed in bronze.

In those times chemical composition was largely a matter of the mineral association and control of physical characteristics was not thought of. Today there are so many different analyses available that it is possible to obtain bronze with the softness of copper or the strength of steel.

Foundry Technique Important

Bronzes are divided into six general classifications and generally composed of seven alloying elements.

Good bronze is a matter of proper sand and metal control and good molding and melting technique. Wherever possible, castings should be made centrifugally. The casting so made is more uniform and less apt to contain gas pockets or inclusions than sand castings.

The use of different alloying elements in various combinations is responsible for the diverse physical characteristics available in bronzes.

Aluminum lightens the alloy, hardens and strengthens it and improves corrosion resistance; iron increases the strength but lowers the elongation; nickel holds lead in suspension and refines the grain; tin hardens the alloy; zinc increases fluidity; lead softens the alloy and improves the bearing qualities.

Six Types of Bronze

The six bronzes in general use today come under the following classifications:

1. *Lead Bronze* is usually composed of varying percentages of copper, lead, and tin. The best known example is 80% Cu, 10% Pb, 10% Sn phosphor bronze.

Phosphor bronze is a misnomer since phosphorus is used as a deoxidizer and is present in the finished casting only in minute quantities.

These bronzes are used chiefly for bushings and bearings, particularly when lubrication is inadequate or doubtful, and it is important that the shaft should not be scored if seizure takes place.

2. *Tin Bronze*—90% Cu, 10% Sn. This is a hard bronze, strong and corrosion resistant.

Nickel Improves Grain

3. *Nickel Bronze*—A typical analysis is 84% Cu, 10% Sn, 2.5% Pb, and 3.5% Ni. Nickel prevents segregation and improves the grain.

These bronzes have relatively low coefficient of friction and find their principal use as gears.

4. *Manganese Bronze*—Like phosphorus, manganese is used as the deoxidizer. This bronze makes a ductile casting of low cost. It is finding increased use in the marine equipment field where there are no wear requirements.

5. *Silicon Bronze* is an alloy of copper containing silicon, manganese, and tin. Outstanding examples are Everdur and Herculoy. It is as strong as steel, and is used for structural members exposed to corrosive conditions.

6. *Aluminum Bronze*—These alloys are the lightest of bronzes. They are hard and strong and have high resistance to fatigue, abrasion, and corrosion. Aluminum bronzes are used for gears, bushings, bearings, liners, slides, and wear plates and flash and butt welding jaws.

Miscellaneous bronzes include several precipitation hardening alloys with small additions of chromium and silicon or cobalt and beryllium. They find their principal use in the welding field, but because of their excellent physical properties and high thermal conductivity are now being tested for many other applications outside this field.

Plastics May Become Decided Competitor To Metals, Says Kline

By Gilbert Soler

Canton-Massillon Chapter—An illustrated lecture entitled "Plastics" was presented by G. M. Kline at the meeting on Dec. 8. Dr. Kline is chief, Organic Plastics Section of the National Bureau of Standards and technical editor of *Modern Plastics*.

Plastic materials are not entirely new, since shellac was known in the Middle Ages, but the period during and following the War showed the greatest development.

Plastics may be classified as synthetic resins, natural resins, cellulose derivatives and proteins. The phenol-formaldehyde plastics comprise about 50% of the commercial synthetic resins.

Larger Parts Now Made

Shapes can be formed by casting, molding under pressure and heat, and injection molding. A large, flat, laminated plastic can be made with reinforcing paper, cloth or wood veneers to give added strength. Because of the enormous pressure required for producing large parts, plastic articles in the past have usually been of small size, but now such articles as cash register cases and automobile trim are being made of plastic materials.

Some properties of plastics are: Lightness, resistance to breakage, formability, facility of working and tooling, transparency, ability to take color, resistance to oxidation and many acids and alkalis, good electrical properties, and attractive surface finish.

Extreme Lightness a Factor

Because of these general properties plastic materials may be a decided competitor to various metals, such as stainless steel, aluminum, and magnesium alloys. Plastics are used in aircraft, automobiles, home articles, building and trimming.

The extreme lightness of reinforced plastics, even though they are lower in strength than some of the metallic materials, may justify their use in aircraft construction.

Dr. Kline illustrated his lecture with slides and two reels of moving picture films showing the production and manufacture of plastics. Movies taken at the rate of 2000 pictures per sec. showed plastic materials subjected to shearing stresses under polarized light, and demonstrated the distribution of stresses produced by an impact machine.

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Special Price for Book on Hardenability Extended

The special pre-publication price of $1.50 to A.S.M. members only for the book on "Hardenability of Alloy Steels" has been extended from Jan. 20 to Feb. 10. Orders received from members of the Society up to that time and accompanied by check or money order for $1.50 will be accepted.

As advertised in the December issue of THE REVIEW, *this book will contain the papers and discussions in the symposium on hardenability of alloy steels presented at the 1938 Metal Congress in Detroit.*

These papers will not be printed in the TRANSACTIONS *of the Society. They will be available only in book form. Price of this 300-page book after Feb. 10 will be $3.50.*

Latest Machinability Research Outlined

By Ray P. Dunn

North West Chapter—The meeting of Dec. 8 was opened with the worthwhile announcement of a series of ten lectures, each one to be given in a different local industrial plant accompanied by actual laboratory demonstrations.

The speaker of the evening, Y. J. Bruce of the Jones and Laughlin Steel Corp. of Pittsburgh, presented his delightfully informal address on "Some Aspects of the Mechanics of Machinability".

Mr. Bruce's company has accomplished considerable research on this subject. Among other things, they have measured the longitudinal, tangential and radial forces on the tool during actual operation by means of a Schiess-Defries dynamometer, and have studied these values in relation to the controlled variables in an effort to evolve some results which will demonstrate an accurate, quick method for measuring machinability.

Movies Show Chip Formation

They have also taken high speed movies of the chip formation on the tool edge by means of a special camera using 800 frames per sec. filming speed with a projected speed of 16 frames per sec.; these ultra-slow-speed motion pictures show very clearly the formation of the built-up edge, the wedge action and the breaking off of the chip (see METAL PROGRESS, Dec. 1938, p. 676).

The combination of these two methods for studying machinability, along with some further research they are making on the subject, has evolved results that hold promise of offering a solution to this fascinating subject.

The illustrated lecture was followed by an interesting, short color movie of the making of steel produced by the Jones and Laughlin Co.

Mr. Bruce was thoroughly questioned during the brief session at the close of the evening; the obvious enthusiasm showed the widespread interest in this problem.

Metallography Paper Presented

By Monte E. Parker

Puget Sound Chapter—At the Jan. 4 meeting Lee T. Holt, consulting physical metallurgist of Seattle, presented one of the finest papers ever received by the Chapter. It was aptly entitled "An Introduction to Metallography".

Mr. Holt had carefully prepared a great many slides depicting crystalline structures of metals, and he explained the methods of identification of various phenomena resulting in sound or weak materials.

Acetylene Torch Can Now Cut Several Parts Simultaneously

Flame Hardening and Softening Developments Also Given in Talk by Crowe

By W. P. Goepfert

New York Chapter—H. W. Zieler, president of E. Leitz, Inc., furnished the entertainment at dinner during the meeting on Jan. 9 by showing numerous slides prepared by color photography. The aesthetic appeal of these slides, together with Mr. Zieler's explanation of the technique involved in their preparation, made an interesting presentation.

J. J. Crowe of the Air Reduction Sales Co., the chief speaker for the evening, presented a talk on "Flame Machining, Flame Hardening and Flame Softening".

Since the introduction of the first acetylene cutting torch into the United States in 1907, great strides have been made in its use in industry. By combining the use of a template with a pantograph arrangement of the torches, several complicated pieces are now cut simultaneously.

Hardening of the surface of the cut is prevented by preheating the metal with a compound nozzle which precedes the cutting torch as it traverses the metal.

It is found that after flame cutting the carbon content at the surface is higher than the normal carbon content of the material. This higher carbon surface is followed by a drop in carbon content of the section immediately below the surface and then a rise to the normal content of the core.

Mr. Crowe attributes this condition to the migration of the carbon toward the hot surface during the cutting.

Flame hardening finds its greatest application in hardening pieces too bulky to be economically handled by furnace methods.

In hardening large gears a compound nozzle is used which causes both sides of a tooth to be heated simultaneously. It is customary to leave sufficient residual heat in the piece being hardened to bring about the desired temper.

The Monarch Machine Tool Co. has had considerable success in extending the life of cast iron lathe beds by flame hardening. A Scleroscope hardness of 79 is obtained on the surface of the bed with a core hardness of 30.

The talk was concluded with the showing of a movie of different torch operations.

1400 Prizes, $125 Given At New Jersey Smoker

By F. A. Pease

New Jersey Chapter—Under the pleased grin of genial Chairman G. M. (Jeff) Rollason, the Third Annual Smoker rolled into history on the night of Dec. 19.

The word "rolled" is used advisedly —the 634 in attendance were not only given an excellent turkey dinner, but were supplied with cigars, cigarettes and much beer.

The sustaining members were more than generous with souvenirs and door prizes, contributing $125 in cash and 1400 other prizes, that were distributed at the door and during the dinner.

The dinner was followed by a show that brought many a sleepy-eyed guest out of his revery to howl his approval.

All reports indicate that the entertainment committee, C. J. Wiegel, A. M. McWilliams and J. F. Wyzalek, can well be proud of their job.

Free Literature — Mail Coupon Below

EPI Microscope

The Zeiss EPI microscope for the illumination and observation of opaque material has unlimited applications for observing opaque material in dark field, bright field, and polarized light. A descriptive leaflet is published by Carl Zeiss, Inc. Bulletin Aa-28.

Bright Annealing

Various types of electric and fuel-fired furnaces built by the Electric Furnace Co. for bright-annealing wire, tubing, strip and other products are described in a new 8-page folder. Bulletin Lb-30.

Gas Carburizing

A proven Muffleless Gas Carburizing Furnace with Continental Hypercarb Process for Hardening Steel is thoroughly described in a colorful 4-page booklet issued by Continental Industrial Engineers, Inc. Bulletin Lb-154.

Microtomes

Bausch & Lomb Microtomes and Accessories are described and pictured in a 16-page booklet just issued by that company. Shows a wide range of instruments and explains their uses. Bulletin Lb-35.

Lubrication Improvements

Intensive research which completed important improvements in the field of heavy-duty gear and bearing lubrication is tabulated in a new 12-page illustrated bulletin just released by D. A. Stuart Oil Co., Ltd. Bulletin Lb-118.

Specialized Tester

The Rockwell superficial hardness tester is a specialized instrument for use where the indentation into the work must be kept shallow or of small area, yet sensitivity preserved. A supplement to Wilson Mechanical Instrument Co.'s catalog on the regular Rockwell tester tells all about it. Bulletin Sy-22.

Char-Mo Atmosphere

A colorful folder explaining how molybdenum steel can be heat treated without decarburization is now available through the Surface Combustion Corporation. Points out advantages of the new Char-Mo furnace and explains its operation. Bulletin Lb-51.

Heat Treat Chart

Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shops. Published by Chicago Flexible Shaft Co., manufacturers of Stewart industrial furnaces. Bulletin Ka-49.

Nickel-Copper Steels

Exceptional resistance to corrosion and abrasion, increased tensile strength, and higher ductility are the qualities claimed for Youngstown Sheet & Tube Co.'s new series of Yoloy steels. A summary of properties and notes on their characteristics are contained in Bulletin Ox-93.

Laboratory Service

A new edition of "The Metal Analyst" tells about an organization established by Adolph I. Buehler specializing in the installation of metallurgical laboratories. The complete line of laboratory equipment marketed by Buehler is also catalogued. Bulletin Dy-135.

Moly in Steel

Metallurgists, engineers and production executives who are really interested in the metallurgy of steels and their application will want the newly published book on molybdenum steels which has just been released by Climax Molybdenum Company. Bound in loose-leaf manner, this reference book is chock-full of tables which form a volume almost an inch thick. Bulletin Hb-4.

Bell-Type Meter

Economical measurement of low-pressure gas with exceedingly accurate results is described in a new booklet issued by The Foxboro Company. Bulletin Nb-21.

Recuperators

Results obtained with Carborundum Company's recuperators using Carbofrax tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data are given in Bulletin Fx-57.

Seamless Tubes

Just prepared by the Timken Steel and Tube Division of Timken Roller Bearing Co. is a "Guide for Users of High Temperature Steels," which presents technical data relating to the various properties of Timken seamless tubes. Bulletin Bb-71.

Pure Metals

Pure, carbide-free metals are described and applications suggested in a pamphlet published by Metal & Thermit Corp., who make pure tungsten, chromium and manganese in addition to the ferro-alloys. Bulletin Ma-64.

Chromel

A new catalog has been issued by Hoskins Mfg. Co. covering Hoskins electric furnaces and Chromel elements, which provide uniform heat and automatic temperature control with excellent production and quality of work. Bulletin Ia-24.

Mo-W High Speed

J. V. Emmons, metallurgist for Cleveland Twist Drill Co. and largely responsible for the development of the molybdenum-tungsten high speed steels known as Mo-Max, has prepared a general description of these new steels. Bulletin Ka-103.

Panphot Microscope

A universal microscope with photomicrographic reflex camera is explained in this well-illustrated booklet by E. Leitz, Inc. Points out applications and advantages of this system. Bulletin Db-47.

Centricast Boxes

The story of centrifugally cast carburizing and annealing boxes—their reasons for being, method of production, properties, and advantages—is made extremely readable in a folder by Michigan Steel Casting Co. Bulletin Jy-84.

Abrasive Cleaning

Comprehensive information on airless abrasive metal cleaning is contained in a new book on the "Wheelabrator" Tum-Blast, a patented mechanical device made by the American Foundry Equipment Co. Bulletin Fa-112.

Turbo-Compressors

Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

Hardness Testers

A handy thing to have around for anyone who does much hardness testing is a complete and detailed catalog of the universal line of hardness testers carried by Pyro-Electro Instrument Co., together with information on various specialized pieces of auxiliary equipment. Bulletin Fb-197.

Defi Rust

Analysis and descriptive notes of nine types of heat and corrosion resisting steels made by Rustless Iron and Steel Co. are contained in a handsome folder. Bulletin Ha-169.

Stainless Data Book

All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc., giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Heroult Furnace

Revised and expanded to include modern major innovations in the construction and operation of the Heroult electric furnace, a new edition of the American Bridge Co.'s Heroult Electric Furnace Bulletin is now ready for distribution. Bulletin Bb-124.

Heat Resisting Alloys

Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Ni-Cr Castings

Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Ingot Production

"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Nichrome Containers

The important part that containers play in economical and dependable carburizing is well known to metallurgists and heat treaters. A Driver-Harris Co. bulletin on Nichrome carburizing containers should therefore not be neglected. Bulletin Ca-19.

Bessemer Steel

Jones & Laughlin Steel Corp. has for distribution reprints of the paper by C. C. Henning on "Manufacture and Properties of Bessemer Steel" that received the Robert W. Hunt Award of the A.I.M.E. during 1935. Bulletin Ca-50.

Electroplating

A complete group of chemicals, processes and materials of interest to those engaged in electroplating is listed in this 8-page booklet published by the E. I. du Pont de Nemours & Co., Inc. Bulletin Eb-29.

Steel Protection

Attractively printed in copper and black, a new booklet on U. S. S. Copper Steel "A Little Copper In Steel Gives a Lot of Protection" has been published by the United States Steel Corp. Subs. Bulletin Nb-79.

Carbide Tools

A new substance with chemical formula $WTiC_2$ is the basic ingredient of "Kennametal", a series of hard, strong carbide alloys for metal cutting tools. A 24-page catalog gives description, prices for blanks, prices for tools, methods of grinding, methods of brazing. Made by McKenna Metals Co. Bulletin R-192.

Rust Proofing

An extremely attractive illustrated booklet by Parker Rust Proof Co. gives details of the Parkerizing process, its advantages, installation of equipment, types of products applied to, tests and service. Bulletin R-193.

Forging Anniversary

Commemorating the 25th anniversary of Steel Improvement & Forge Co., a 34-page book, "Forging Ahead With Forgings", has been issued. Attractive and interesting, it is also replete with valuable technical information and useful practical hints. Bulletin R-194.

Gas Burning Equipment

Packing a great deal of useful information, diagrams and charts into a handy folder, Hauck Mfg. Co. tells about low pressure air-gas induction mixers, high pressure gas inspirators, high pressure air boosters, and burner nozzles and tunnel assembly. Bulletin R-195.

Testing with Monotron

Shore Instrument & Mfg. Co. offers a bulletin on Monotron hardness testing machines which function quickly and accurately under all conditions of practice. Bulletin Je-33.

Steel Stock List

A handy pocket-size booklet containing an explanation of the change in steel classifications and extras, as well as general data tables, is now available through Joseph T. Ryerson & Sons, Inc. Bulletin Nb-106.

Accelerated Salt

A Technical Service Bulletin issued by R. & H. Chemicals Dept. of E. I. du Pont de Nemours & Co. gives complete details about their new Accelerated Salt. Bulletin Nb-29.

Welding Aluminum

A very attractive little 48-page booklet which tells all about the welding of aluminum and its alloys has been issued by the Aluminum Company of America. Describes the different methods of welding and shows by means of pictures and diagrams the best methods of welding. Bulletin Hb-54.

Potentiometer Type

Potentiometer type pyrometers, indicating, recording and controlling, are catalogued in a 48-page booklet by Brown Instrument Co., well printed in three colors. Includes the new Electro-Line controllers and the Brown proportioning control system. Bulletin La-3.

Model "Y"

The Sentry Model "Y" electric furnace, using the Sentry Diamond Block method of heat treatment provides exceptional quality high speed steel hardening at minimum production cost. The furnace is described in Bulletin Oy-114.

Tool Steel Selector

A wall chart, 30 x 20 in., to be used as a means for selecting the proper type of tool steel is offered by Carpenter Steel Co. to tool steel users in the U.S.A. only. Bulletin Je-12.

Small Appliances

A very helpful booklet showing various small appliances for a wide variety of heating jobs is now available through the American Gas Furnace Co. Bulletin Ac-11.

Duronze III

A technical bulletin covering Duronze III, a patented high strength silicon aluminum bronze, has just been released by the Bridgeport Brass Co. Describes typical uses and shows comparative tables. Bulletin Ac-163.

Wide-Strip Pyrometer

Complete information on the new Bristol Multiple Record Wide-Strip Pyrometer can be obtained through the Bristol Company. Gives up to 8 temperature records on the same chart. Bulletin Ac-87.

Brazing Tool Tips

The correct procedure to follow in brazing cemented carbide tool tips to tool holders is fully described in a recent booklet issued by Handy & Harman. Bulletin Ac-126.

Cutting Oils

"CUT-MAX" straight cutting oils and bases are described in a colorful booklet just released by E. F. Houghton & Co. Includes check list for cutting fluids. Bulletin Ac-38.

Steel Fabrication

Correct methods for fabricating nickel-clad steel plate are technically outlined in a 16-page folder issued by the International Nickel Co. Includes are pictures of correct procedure and helpful tables. Bulletin Ac-45.

Heat Treating

Wide range of heat treating information is now available at Lindberg Steel Treating Co. This will show how commercial steel treating will improve your product. Write for bulletin Ac-66.

Sabotage

Dust problems, as symbolized by the Pangborn Dust Hog, are discussed in a recent booklet, "Wanted in Every State for Sabotage," which has just been released by the Pangborn Corp. Bulletin Ac-68.

Alloy No. 10

A high temperature muffle furnace, the first of the Hevi Duty line of laboratory furnaces equipped with Alloy No. 10 allowing working temperatures to 2400° F., is described in Bulletin Jb-44.

Normalizing Heat

"1300 Lbs. Up to Normalizing Heat in 30 Minutes," is the title of a 4-page folder just released by the Leeds & Northrup Co. Bulletin Ac-46.

Dehumidifier

Lectrodryer systems, employing activated alumina for drying air and gases by absorption, are described in an attractively illustrated booklet by the Pittsburgh Lectrodryer Corp., Pittsburgh. Bulletin Bb-187.

Ferro-Alloys

An interesting folder by Electro Metallurgical Co. tells all about their ferro-alloys and their special service to users which will help them to operate their furnaces and make alloy additions under the proper conditions. Bulletin Jy-16.

Tool Steels

Information about the fine steels made by the Uddeholme Company of America, Inc., can be obtained by requesting Bulletin Eb-196. This company controls its output completely from the ore mine to the consumer.

The Review
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				Ca-50	Nb-106	Ac-87	Jy-16
				Eb-29	Nb-29	Ac-126	Eb-196
						Ac-38	

HERE AND THERE WITH A.S.M. MEMBERS

DANIEL S. EPPELSHEIMER, formerly with the Union Carbide and Carbon Research Laboratory, Niagara Falls, N. Y., has recently been appointed research associate professor of industrial engineering at the University of New Hampshire to head up the industrial research department of the Engineering Experiment Station of the College of Technology in Durham, N. H.

D. S. Eppelsheimer

But even this wordy title does not define the scope of Dr. Eppelsheimer's activities. The industrial research department of the Station acts as the research laboratory of the small industries of New Hampshire. Any manufacturing concern that falls in this category is privileged to call on the Engineering Experiment Station for assistance in solving any problem of such a nature that it would receive attention by its own research staff provided it were large enough to maintain such a staff independently.

This definition is interpreted generously by Dr. Eppelsheimer's department, due to the lack of technically trained men in many of the small and medium sized plants in the state.

WILLIAM P. KNECHT, past chairman Boston Chapter, sailed from Boston Dec. 11 on the Motorship Georgic, with his family. Bill is establishing his new home on the outskirts of London where he hopes to resume his Lexington title of "gentleman farmer".

However, Bill will be a mighty busy man when he is not a-hoeing, with his promotion to European manager for the Crucible Steel Co. of America.

* * *

SEVERING a 20-year connection as engineer and sales representative for the Strong, Carlisle & Hammond Co. upon their discontinuance of the manufacture of furnaces, A. B. LINDSAY has announced the formation of Lindsay & Co., Cleveland, organized for the engineering and construction of gas, oil and electric industrial furnaces.

* * *

MANAGER of laboratories for Robert W. Hunt Co., Engineers, is now WILDER A. CHAPMAN, who left a 14-year connection with Skinner and Sherman, Inc., of Boston to come to Chicago.

He joined the latter organization in 1924 and has been secretary, director and clerk since 1930. Mr. Chapman's earlier associations were with the Solvay Process Co. and the Delaware, Lackawanna and Western Railroad. He is a graduate of Tufts College with a B.S. in chemistry.

APPOINTED superintendent of the salvage department, Gary Works of Carnegie-Illinois Steel Corp., is ROBERT A. PETERSON.

Mr. Peterson first started with U. S. Steel in 1934 as rolling mill advisor for the American Steel and Wire Co. after four years as manager of heavy mill sales for Aetna Standard Engineering Co. and ten years as superintendent of erection for Morgan Construction Co. In 1936 he joined the Gary Works as assistant superintendent of the merchant, wheel and axle mills and a year later he was made superintendent of the merchant bar mill, the position he held until the present time.

* * *

OTHER recent appointments of A.S.M. members at the Gary Works of Carnegie-Illinois are ERLE G. HILL as assistant to general superintendent of technological coordination, and JOHN J. GOLDEN as superintendent of steel production.

E. G. Hill

Hill studied mining and metallurgy at University of California and did graduate work at Carnegie Institute of Technology and University of Pittsburgh. Starting his business experience in 1913, he was employed by various mining and construction companies as miner, assistant mill superintendent and mill superintendent until 1918, when he became an instructor of mining engineering at Carnegie Tech. Two years later he went to the University of Pittsburgh as associate professor of metallurgy, and remained there until 1931 when he accepted a research fellowship at Mellon Institute. Since 1934 he has been director of research of Lukens Steel Co.

Mr. Golden comes to Gary Works from the Corporation's South Chicago plant where he began in 1911 as an office boy. He served as a relief foreman, stock foreman, general relining foreman, and assistant superintendent of various open-hearths. In Oct. 1935 he was advanced to the superintendency of the No. 2 open-hearth at South Works and remained in that capacity until his present appointment.

DIED

A. G. LOTT, shop manager, Hinderliter Tool Co., Tulsa, Okla. (Texas Chapter).

* * *

B. F. KILBORN, foreman, Hughes Tool Co., Houston, Texas (Texas Chapter).

* * *

CARL R. E. WOHRMAN, H. A. Wilson Co., Newark, (New Jersey Chapter).

Large Economies Result From Use of Correct Refractories in Metallurgy

By Bernard Collitt

Montreal Chapter—The second meeting of the 1938-39 season was held on Nov. 7 with a record attendance of 544 members and guests—proof of the healthy progress and organized activity of the Chapter.

J. W. Craig, manager of development and research of Canadian Refractories, Ltd., reviewed "New Developments in Refractories for the Metallurgical Industries". Stress was laid on the large economies resulting from the use of the correct refractories.

Lantern slides illustrated the refractories used throughout the iron and steel, copper and nickel, Portland cement and other major industries. Furnace drawings showed causes of failure and incorrect application of refractory materials.

The part played by research in developing Canadian raw materials for export throughout the world, in competition with other countries, was of particular interest.

The coffee talk period was occupied by a showing of the United States Steel Corp. technicolor sound film entitled "Steel, Man's Servant." A. W. Allyn of the United States Steel Products Co. was instrumental in bringing this splendid film to Montreal.

Hook to Deliver Lecture

A slight change has been announced in the educational course soon to be presented by the New Haven Chapter. The sixth lecture, scheduled for March 27, 1939, will be delivered by Prof. I. T. Hook on "Inspection and Testing Methods".

He will be assisted by George B. Colton, who has resigned from Yale University to become assistant chief engineer, Crawford Oven Division of American Car and Foundry Co. in New Haven, where he is in charge of research and development.

The course consists of six lectures to be presented weekly in Yale's Hammond Laboratory starting Feb. 20.

Local Member Gives Complete Resume Of Physical Testing

By Ken W. Johnson

Texas Chapter—An exceptionally nice turnout at the meeting on Dec. 15 may or may not have been due to the fact that the members were again guests of the Gulf Brewing Co. in its spacious "Jinx" room.

Chairman C. H. Shapiro opened the meeting, and after a short business session, introduced the speaker for the evening. He was none other than our most able secretary, Charles F. Lewis, metallurgical engineer for the Cook Heat Treating Corp. His subject was "Physical Tests".

Physical testing constitutes rather a broad subject to be taken up in one lecture. However, in the short space of two hours Mr. Lewis had given his listeners a complete résumé of the common methods of physical testing, and presented them in a manner understandable to the shop men who make up a large part of the Texas Chapter.

Stress-Strain Diagram Explained

The first part of the lecture was given over to an explanation of a stress-strain diagram, and Charlie explained the proportional limit, elastic limit, yield point, "E" and other tensile properties. He showed graphically the difference between the usual stress-strain diagram and a "corrected" stress-strain diagram—the difference is due to the fact that on the corrected curve the stress is calculated from the actual area in the gage length—corrected for Poisson's ratio and necking.

Torsion testing was explained very simply, as were Brinell, Rockwell, Scleroscope, Monotron, Vickers and other common hardness measurements.

Fatigue failures, being very common in oil field materials, were discussed at greater length than some of the other tests, and the S-N curves used for finding the endurance limit of materials in fatigue were ably explained.

The new type of variable speed tension-impact test now being studied at the Watertown Arsenal by Mr. Mann was taken up, and the known facts concerning this test explained. This method of testing has great possibilities, but as yet results have not been definitely interpreted for the designer.

The meeting had one most pleasurable departure from standard in that a seventh inning stretch was taken in order to wet the whistle with good lager and to allow the speaker to catch his breath.

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Detroit Holds Round Tables

(Continued from page 1)

Malleable Iron was headed by Carl Joseph of Saginaw Malleable Iron Co. Mr. Joseph showed a number of slides and discussed and answered questions pertaining to each. In some cases, he exhibited samples of castings.

Mr. Joseph pointed out the fact that some pearlitic malleable iron parts are being differentially hardened and used in parts formerly made of hardened steel and in some places carburized and hardened steel forgings. It was surmised from the attendance and questions asked that while the applications were not extensive, the interest in the subject was.

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Detroit Attests to Unqualified Success Of Christmas Party

By V. A. Crosby

Detroit Chapter—That the annual Christmas party was an unqualified success would be strongly attested by (1) the 75 Detroit A.S.M. members who won turkeys in the drawing, (2) Tony Taylor of Rotary Electric Steel Co., winner of a complete electric roasting outfit donated by National President William P. Woodside, (3) the numerous candid camera enthusiasts who thoroughly enjoyed the opportunity to snap members and entertainers with bold impartiality.

Only slightly less convincing would be the complimentary arguments of the 300 members who pronounced the fine steak dinner, the service and entertainment equal to anything Detroit Chapter members have been privileged to enjoy in recent years.

Several innovations marked the introduction of the A.S.M. party to Sak's Cafe on Woodward Ave. For the first time in several years, the punch bowl was eliminated. Instead members received merchandise checks good for $1.00 in purchases.

Another interesting change was the holding of two prize drawings and two complete floor shows instead of the usual floor show followed by a prolonged turkey drawing until the wee hours of the morning.

It is perhaps unfortunate (or is it?) that the story of the Detroit Chapter party cannot be told with the impromptu candid camera shots made by some of the members present. On one occasion, at least, the timing was superb and undoubtedly many members would like to see the results. Come again next year, candid camera hounds, and lets have some of the results for publication!

A generous vote of thanks goes to Permanent Chairman Leonard Massey of Chrysler Corp. and his capable assistants for planning the party and making the arrangements.

CHAPTER CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Feb. 20	Engineers Club	H. M. Shepard	Copper Refining
Boston	Feb. 3	M.I.T. Room 6-120	R. S. Archer	Hardenability Test for Steel
Buffalo	Feb. 9	Hotel Buffalo		Liquid Atmospheres
Calumet	Feb. 14	Woodmar Country Club, Hammond, Ind.	E. F. Davis	Machinability
Canton-Mass.	Feb. 17	Shady Hollow Country Club		Midwinter Party
Chicago	Feb. 9	Medinah Club	C. H. Herty, Jr.	Steel Making
Cincinnati	Feb. 9	Hotel Alms	E. G. Mahin	Inclusions in Steel
Cleveland	Feb. 6	Cleveland Club	W. P. Woodside	Evolution of Heat Treating
Columbus	Feb. 7		S. C. Lawson	Bronze and Bearing Metals
Dayton	Feb. 8	Engineers Club	S. C. Lawson	Bronze and Bearing Metals
Detroit	Feb. 13	Fort Shelby Hotel	L. B. Tuckerman	Parts Performance and Post Mortems of Structures
Hartford	Feb. 14	Hartford Electric Light Co.	James P. Gill	Modern High Speed Steels
Indianapolis	Feb. 20	Washington Hotel	Garnet P. Phillips	Cast Iron
Lehigh Valley	Feb. 3	Hotel Traylor, Allentown, Pa.	Bradley Stoughton	Reminiscences
Los Angeles	Feb. 9			Aluminum Forging
Mahoning Valley	Feb. 14	Ohio Edison Auditorium, Youngstown, O.	R. S. Archer	Hardenability of Steels
Milwaukee	Feb. 8	Milwaukee Athletic Club	C. H. Herty, Jr.	Steel Making
Montreal	Feb. 6	Windsor Hotel	H. V. Thaden	Aircraft Metals
Muncie	Feb. 26		F. J. Robbins	Lead Bearing Steels
New Haven	Feb. 8	Derby Gas & Electric Co., Derby, Conn.	J. D. Corfield	Heat and Corrosion Resistant Castings
New Jersey	Feb. 20	Essex House, Newark	W. P. Woodside	Panorama of Alloys in Steel
New York	Feb. 13		Earle C. Smith	Steel Manufacturing Processes
North West	Feb. 9	Minnesota Union, U. of Minn.	R. D. Allen	Trouble Shooting on Steel Problems
Notre Dame	Feb. 8	Engineering Auditorium U. of Notre Dame	G. D. Tranter	Development of the Open-Hearth Process
Ontario	Feb. 3	Toronto	A. Krogh	Furnace Atmosphere Control
Oregon	Feb. 10	Lloyds Golf Club	H. J. French	Nickel Alloy Steels
Peoria	Feb. 13	Caterpillar Show Room.	F. C. Smith	Steel—Man's Servant
Philadelphia	Feb. 24	Manufacturers Club	V. N. Krivobok	Evaluation of Alloying Elements in Carbon and Complex Steels
Pittsburgh	Feb. 9	Roosevelt Hotel	W. B. Hoey	Modern Plastics
Puget Sound	Feb. 8	Engineers Club, Seattle, Wash.	H. J. French	Nickel Alloy Steel
Rhode Island	Feb. 1	Providence Engineering Society Bldg.	A. D. Bach	Practical Heat Treatment
Rochester	Feb. 13	Todd Union, U. of Rochester	D. P. Forbes	Modern Cast Iron
Rockford	Feb. 16	Nelson Hotel	L. W. Wallace	Joint Meeting with Rock River Engineering Council
Saginaw Valley	Feb. 21	Durant Hotel, Flint, Mich.	John Golden	Alloy Steel Practice
Schenectady	Feb. 21	Van Curler Hotel	E. R. Parker and E. L. Robinson	Creep Studies
Springfield	Feb. 20	Hotel Worthy	O. V. Greene	Hardening of Steel
St. Louis	Feb. 17	York Hotel		
Syracuse	Feb. 15	Syracuse Hotel	V. N. Krivobok	The Structure of Metals
Texas	Feb. 17			Chapter Dance
Toledo	Feb. 27	University Club	S. L. Hoyt	Aspects of Metallurgical Research
Tri-City	Feb. 20	Fort Armstrong Hotel, Rock Island, Ill.	F. F. Vaughn	Heat Treating Cast Iron
Washington	Feb. 13	Garden House, Dodge Hotel	F. B. Foley	Hardenability
Worcester	Feb. 8	Sanford Riley Hall, Wor. Polytech. Inst.	Donald J. Reese	Metallurgy of Cast Iron
York	Feb. 9	York, Pa.	John H. Frye	Some Thoughts on Steel Application

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